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FACTS

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ABOUT RESOURCE RECOVERY

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The Province of Ontario has undergone an expansion of population, of rapid urban growth and of the production and consumption of goods and energy without parallel. This has contributed greatly to the prosperity and well-being of the people of this province. Unfortunately, in this and other advanced industrial nations, these very successes have generated new problems.

One of the most critical problems facing us today is how to deal with the huge and growing volume of waste produced by our affluent, throw-away society. On a broader scale the urgent need for conservation of diminishing world resources has been dramatically emphasized by recent events.

A number of separate waste management programs have been developed in the short time since the province assumed responsibility in this field via The Waste Management Act of 1970.

These approaches have been integrated into a single comprehensive provincial program which uses every means available to recover all of the valuable resources from the waste produced, and at the same time to eliminate unnecessary waste.

The provincial plan is designed to provide in three five-year stages all the facilities necessary for complete resource recovery, to serve at least 90 per cent of the population of the province, and all but eliminate the need for the landfill of waste.

This can only be achieved by a major government effort but it will also require the co-operation of municipalities, industry and the public.

The difficulties must not be underestimated. Although the development of technology has been proceeding very rapidly indeed over the past few years, it has not yet been proven for practical use. Pilot plants built to demonstrate the operation of particular proprietary processes or equipment are of very limited value.

Moreover, the development of new markets and new uses for the material separated from waste must proceed at the same pace as technological development if resource recovery from waste is to be of real rather than merely token benefit.

The comprehensive provincial program is designed to provide both short and long-term solutions to these problems, not just for metropolitan areas, but for municipalities of all sizes.

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Related Programs

Waste management planning studies, apart from providing essential basic data on the quantities and types of waste produced, lead to the development of improved waste management systems. Generally, this will involve the replacement of landfill disposal sites by transfer stations and the use of efficient, long-haul transportation to carry the waste to a comparatively few central facilties.

The Ontario Centre for Resource Recovery, incorporating a full-scale experimental reclamation plant, is being built to find and prove the technology for complete resource recovery. It will also provide a regular supply of separated material, of controlled quality, which is necessary for the development of markets and new uses for the separated waste material, and in addition will provide a training-ground for operators of future plants.

Technology

A complete resource recovery plant can be considered in two sections, generally called front-end and back-end processes. The technology for front-end processing is relatively well developed. This includes shredding the waste to a uniform size, magnetic separation of tin cans and other ferrous metals, and air classification processes to separate the remaining waste into two streams, a light fraction composed principally of paper fibre and plastic film, and a heavy fraction composed principally of non-ferrous metals, glass, organic material, plastics, and the miscellany of other materials which may be found in waste.

The back-end processes include a very large number of possible different options, directed at the separation of all these materials in different forms, depending upon the market to which they will be directed. The technology for these back-end processes is relatively undeveloped and unproven.

It is important to note that the front-end processes have many advantages in themselves, even if the material produced is subsequently landfilled, or incinerated for the production of energy, as an interim measure. Nuisance effects are almost eliminated, cost is reduced, and a proportion of marketable materials can be recovered immediately.

The provincial program is based on this approach, which provides substantial benefits now, and is sufficiently flexible so that immediate advantage can be taken of new processes and equipment as they are developed and proven at the reclamation research centre.

Program Stages

Stage 1

During stage 1, waste management systems throughout the Province will be improved by the replacement of disposal sites by transfer stations, so that disposal operations in a particular area are concentrated in a few large sophisticated facilities.

At the central facilities serving major population centres front-end processing plants will be installed. At those plants, a proportion of readily separable and marketable material such as corrugated paper, bundled newsprint, and ferrous metals will be removed for sale, and the remainder shredded.

Air classification equipment will be installed at locations where a use exists, or can be developed, for the light or heavy streams which will be produced.

During this period, Environment Ontario may also support certain large-scale demonstration projects as an interim measure providing that they are compatible with the objectives of the provincial program, and are sufficiently flexible to be incorporated within the program eventually. Generally, these will be experimental projects which can only be proven in actual practice. The Watts from Waste project, which is essentially a front-end plant using the separated light fraction as a fuel in existing boilers, at Lakeview Generating Station is a typical example of such a project.

Stage 2

During stage 2, the provision of transfer stations and transportation networks should be completed throughout the Province, which will enable the remainder of the front-end plants needed to be constructed.

The full development of this concept is, however, contingent upon the improvement of long-haul transportation of waste, by the use of rail-haul for example.

During this stage, also, sufficient progress should have been made in process technology and market development to enable work to begin on the installation of proven back-end recovery processes.

Stage 3

Finally, in the third stage, it will be possible to complete the program by the installation of complete resource recovery processes, serving 90 per cent of the population of the Province, and all but eliminating the need for the landfill of municipal waste.

Front-end Processing Plants

Ontario has offered to work with municipalities to construct area front-end processing plants. The entire capital cost will be provided by the Government of Ontario, 50 per cent being recoverable over a forty-year period, as an addition to the user charge per ton of waste processed at the plant.

Since some of the plants, even initially, will serve more than one municipality, the Province, through the Ministry of the Environment, will retain ownership to ensure that their design and operation are compatible with the comprehensive provincial program, and to co-ordinate and develop markets for reclaimed materials.

Ministry staff is also meeting with the private waste management companies and the recycling industry to discuss their role in the provincial program. They will have a very significant role, both in the first stages of the program and increasingly in the future.

The provision of front-end plants alone does not pretend to be a complete solution to municipal waste management problems. However, it is a necessary first step, and a very substantial step towards the complete solution which is the goal of the comprehensive provincial program. A proportion of the waste will be reclaimed for reuse immediately and this and the processing of the remainder, will reduce landfill requirements, the cost of transportation and landfill, and very substantially reduce disposal problems, even during the comparatively short time until further processing equipment for greater resource recovery can be introduced.

Waste Management Advisory Board

A major program objective is to reduce the quantity of waste produced. Apart from this, it is unlikely that the other objectives can be fully achieved unless action is taken to minimize the misuse of materials which results in unnecessary waste or which may make it more difficult to recover these materials, and to investigate in depth all of the non-technical constraints which may operate to inhibit the economic use of recovered materials.

A Waste Management Advisory Board has been set up to investigate and advise on these particular problems.

The extent and significance of the work which the board is being asked to do cannot be over-emphasized. It is essential that it be carried out in parallel with investigation into process technology at the resource recovery centre, and that very close liaison be maintained between the board, and the staff of the Ministry of the Environment responsible for the implementation of the comprehensive resource recovery program.

THE ONTARIO CENTRE FOR RESOURCE RECOVERY

In autumn 1977, the $13.8 million Ontario Centre for Resource Recovery on Vanley Drive in Downsview will begin reclaiming up to 600 tons of Metropolitan Toronto garbage every day.

More than 600 tons are now compressed and transferred into long-haul vehicles for transport to landfill daily. As the plant processes go on stream in the fall, more and more garbage will be the raw material for one of the world's most sophisticated and comprehensive research programs into the uses for garbage in a unique experimental plant.

Goals:

The experimental plant has been designed to meet these three objectives:

- to establish cost and operating efficiency data for these unit processes of resource recovery -- manual separation, shredding, air separation, air classification, magnet separation, screening, compaction, baling, composting and energy recovery.
- to generate working quantities of recovered materials to establish markets for future municipal resource recovery plants.
- to investigate new unit processes of resource recovery and their possible application to future municipal resource recovery systems.

How It Works:

The experimental plant accepts household refuse and commercial and industrial solid waste, including oversize bulky wastes such as refrigerators, stoves, etc., and produces baled paper, baled cardboard, ferrous metal, non-ferrous metal, glass, paper fibre, organic fibre, compost and energy.

Garbage collection trucks pass over a weigh scale to enter the receiving building for discharge. Here the refuse is either compacted for transfer or conveyed to the resource recovery processes. Commercial collection trucks containing primarily corrugated cardboard or mixed wastepaper discharge near a special conveyor where this material can be hand-sorted and baled for sale to wastepaper users.

The main stream of waste for resource recovery moves along a vibrating conveyor where more salvageable paper materials and potentially hazardous items are knocked off. This conveyor feeds a thousand horsepower shredder which reduces refrigerators, stoves, tires and any other material to particles smaller than six inches in size.

In an air separator, a three thousand foot per minute upward air stream lifts shredded paper and film plastic from the waste stream. This light fraction, after further separation in a classifier is blown through pneumatic tubes to a one hundred ton storage bin where it is available for use as an energy souce or as a raw material for the recovery of paper fibre. Some of this light fraction is used to heat the experimental plant.

The heavy material, including shredded metal, glass and food wastes, is conveyed to the commodity recovery building where ferrous materials are removed by an electro-magnetic separator. The recovered ferrous metal is shredded further and stored for shipping.

The remaining heavy material passes a manual separating station for recovery of non-ferrous metals such as brass or aluminum. The waste stream now enters a revolving screen where crushed glass and ceramics fall through quarter-inch mesh openings to an air classifier which removes any residual organic material. The glass fraction is lifted by a bucket elevator to a storage bin for shipping to the glass container industry or other secondary industries using crushed glass.

Oversize material from the revolving screen stage is finely ground and fed into an air separator to recover any remaining organic material which is conveyed to storage in another hundred-ton bin. This material may be used for energy recovery or may be further processed in the compost section.

In the compost section, organic material is mixed with sewage sludge and fed to the composter. Forced air keeps bacteria alive in breaking down the material into a good soil conditioning mix which can be marketed or used in land reclamation.

An extensive system of monitoring equipment and instruments throughout the plant assesses each of the many resource recovery processes.

A Working Model:

A 48/1 scale model of the experimental plant for resource recovery uses narration, sequential lighting and animation to illustrate the operation of the experimental plant. This model provides an accurate and dramatic representation of the functions of the recovery to general and specialist audiences across Ontario and in the training of operators for future Resource Recovery Plants.

For Further Information:

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